User manual visocolor® photino

visocolor® photino is a handheld mini photometer for the analysis of chlorine (free and total), pH and cyanuric acid in water samples. The instrument is precalibrated for the use with reagents of type visocolor® ECO from MACHEERY-NAGEL. Together with the instrument, reagent kits are needed, one specific for each of the three parameters:

- Chlorine (free/total): visocolor® ECO Chlorine Cat. No. 931 215
- pH: visocolor® ECO pH 6.0 – 8.2 Cat. No. 931 270
- Cyanuric acid visocolor® ECO Cyanuric acid Cat. No. 931 223

Before starting a test, the entire instrument manual and the test procedures for the reagents must be read.

1. Content
1 carrying case
1 photometer visocolor® photino
3 batteries
4 tubes
1 syringe 10 ml
1 funnel
1 plastic beaker 25 ml
1 manual
test instructions (pictographs)

2. Instrument description
Top view on visocolor® photino

1 Display
2 On/Off button
3 Select button
4 Cuvette slot
5 Batterie compartment with 3 AA batteries
6 Cover for batterie compartment
7 Dip switches for language selection

Bottom view on visocolor® photino

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3. Technical Data

Type: handheld LED photometer, preprogrammed with 3 calibrations
Optics: narrow band LED with 525 nm
Detector: photovoltaic cell
Display: alphanumeric LC display 2 x 16 characters
Operation: microswitch for automatic release of measurements
2 foil-covered keys
User languages: operator controlled selection of various languages (max. 4 per instrument)
Autoblank: optional operator controlled feature
Automatic shut off: after 15 min
Stability: < 0.005 E/h
Power supply: 3 AA batteries
Temperature range: 0 – 50 °C (operating); 0 – 95% rel. humidity
Housing: corrosion and water resistant ABS plastic; sealed and splash proofed foil keypad
Dimensions: 146 x 91 x 50 mm
Weight: 340 g
Warranty: 2 years

4. Preparing for Operation

Installation/Replacement of batteries
Remove cover of battery compartment and insert/replace 3 AA batteries. Follow polarity markings shown in battery compartment. Rechargeable batteries may be used, but cannot be recharged in the instrument. Do not mix regular batteries with rechargeable ones. Do not use a mixture of different battery brands. Always change all 3 batteries at the same time. If visocolor® photino is not expected to be used for periods exceeding 1 month, remove the batteries to avoid damage due to possible battery leakage.

Selection of user language
The user language can be preselected with the help of small dip switches, located in the battery compartment of the instrument. To select a language, switch off instrument and open the battery compartment. Set the dip switches in accordance with the marking label in the battery compartment. Close the battery compartment and switch on the instrument. All messages are now displayed in the selected language. If you want to change to another user language, please follow again the above procedure.
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General operation
Allow visocolor® photino to come to temperature equilibrium. When moving from one temperature extreme to another, wait at least 10 min before use.

Before starting a test, read the entire procedure in the test instructions to be sure to use correct volumes and sequences of added reagents. Pictographs will guide you step by step through the procedure.

During analysis the instrument requires inserting "BLANK" tubes and "SAMPLE" tubes. The meaning of "BLANK" and "SAMPLE", as used for visocolor® photino, is explained in the following:

A "BLANK" tube is one which contains the pure and untreated test sample (with no reagent added). The "BLANK" tube compensates for any original, inherent colour in the test sample that has nothing to do with the colour that will appear after adding the reagents during the test procedure. With the "BLANK" tube, the photometer gets its baseline; it is "zeroed".

The "SAMPLE" tube is the tube, which contains the test sample to be analyzed, to which the reagents have been added in accordance with the test procedure.

Once zeroed with the "BLANK" tube, the visocolor® photino measures the colour of the reagent treated sample in the "SAMPLE" tube, and then calculates and shows the result in the display.

5. Conducting a test procedure

The following instructions cover the general operating steps, that apply to all tests, which can be measured with visocolor® photino.

1. To activate the instrument, push the "On/Off" button (I/O) on the faceplate. The display will prompt:

2. After a few seconds the instrument automatically goes into method selection mode. It will continuously display the 3 pre-programmed methods one after the other:

Press the "select" key, when the method of your choice is displayed. If you unintentionally selected the wrong method, please switch off the instrument. Then switch it on and start selection again.

3. After method selection, the instrument automatically goes into autoblank selection mode. It will continuously display:

Press the "select" button, when the autoblank function of your choice is displayed. If you unintentionally selected the wrong autoblank function, please switch off the instrument. Then switch it on and start selection again.

"AUTOBLANK ON" will speed up your analysis time. For a series of subsequent analyses of the same parameter, only one "BLANK" value is required and will be stored for the complete series until you select another method. This allows quick, multiple sample readings without inserting a 'BLANK' tube between each measurement.
"AUTOBLANK OFF" means, that the instrument requires inserting a "BLANK" tube before each measurement. The instrument then compensates the original, inherent sample colour of each sample under test. It prolongs analysis time, but is recommended when the samples under test have different original sample colours.

4. After autoblank selection, 
   a) the instrument automatically goes into measuring mode. It prompts:

   ![INSERT BLANK](<METHOD> *)

   ![READING BLANK](<METHOD> *)

   ![REMOVE BLANK](<METHOD> *)

   And then:

   ![INSERT SAMPLE](<METHOD> *)

   Remove "BLANK" tube. Display prompts:

   ![INSERT SAMPLE](<METHOD> *)

   c) Insert "SAMPLE" tube. Display prompts first:

   ![READING SAMPLE](<METHOD> *)

   Then the result is displayed, e.g.:

   ![1.00 mg/L](<METHOD> *)

   d) If you now remove the "SAMPLE" tube, the instrument remains in the selected method and is ready for further measurements.

   e) But if you like to change to another one of the 3 preprogrammed methods, then leave the "SAMPLE" tube in the instrument and press the "select" button. The instrument prompts:

   ![REMOVE SAMPLE](<METHOD> *)

   After you removed the "SAMPLE" tube, the instrument automatically goes into the method selection mode. For method selection follow the steps as described under point 2 in this chapter.

   f) If you have no further samples to test, remove any tube from the instrument and press the On/Off (I/O) button to shut off.

*Depending on your previous method selection (as described under step 2 in this chapter) the displayed <METHOD> will be either:

CHLORINE or pH or CYANURIC ACID
User manual visicolor® photino

6. Trouble shooting

Dilute and retest
If the displays prompts:

and then:

this indicates, that the concentration of the sample is higher than the normal range of the test kit. The original untreated sample must be diluted, the test repeated [again starting with step 4 c) of the above chapter], and the result must be multiplied by the respective dilution factor.

The enclosed 10 ml syringe permits routine dilutions to be made easily and quickly. Simply add 1, 2 or 5 ml sample into the test tube and add 9, 8 or 5 ml deionized water, close the cap and mix. With this diluted sample, perform the analysis as described in the test instructions and this photometer manual. Multiply the reading by the dilution factor:

For example:

<table>
<thead>
<tr>
<th>Add</th>
<th>Add</th>
<th>Multiply reading by factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ml</td>
<td>9 ml</td>
<td>x 10</td>
</tr>
<tr>
<td>2 ml</td>
<td>8 ml</td>
<td>x 5</td>
</tr>
<tr>
<td>5 ml</td>
<td>5 ml</td>
<td>x 2</td>
</tr>
</tbody>
</table>

sample to test tube deionized water to the same test tube

Alternatively, for highest precision, use laboratory volumetric pipettes and volumetric flasks for dilution of the sample.

Offscale
If the display prompts:

and then:

make sure that "BLANK" tube and "SAMPLE" tube are not interchanged accidentally. Remove the tube from the instrument, switch off the instrument and restart analysis with fresh sample and fresh reagents starting with step 1. of the above chapter.
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Automatic power off
To conserve battery life, visocolor® photino shuts itself off automatically 15 min after the last key press.

Replacement of batteries
The visocolor® photino may display two warning messages. "BATTERIES LOW" is a first warning. You may still be able to perform several tests, but it is wise to replace the batteries as soon as possible to insure uninterrupted service. The message will continue to appear at the end of each subsequent test until either fresh batteries are installed, or the batteries continue weakening to the point that the message "BATTERIES DEAD" appears (or the display remains blank). In this event no further test can be performed unless the batteries are replaced.

To replace batteries, please follow chapter 4, section 'Installation/Replacement of batteries'

Self diagnosis and calibration
visocolor® photino performs a self-diagnostic step each time it is turned on, checking its batteries, analog function, LED lamp and photocell. Aside from its batteries, it contains no user-serviceable parts. If a problem arises that is not covered by this manual, please contact your local MACHEREY-NAGEL dealer or visit our website www.mn-net.com and ask for further support.

visocolor® photino works with permanently programmed calibration curves for all parameters. No recalibration by the user is ever needed.

When test results are in question
If the instrument itself seems to be functioning correctly, but the results seem to be wrong, first review this manual and the following:
1. Has the sample been taken correctly? Has it changed in value due to settling over time, or due to exposure to heat or cold? Was it kept in a container that may have contaminated it?
2. Were the test tubes clean and dry before use? Were the tubes free of finger marks, scratches or stains? Are bubbles clinging to the insides of the tube? Is condensation on its outside? Retest and pay attention to these factors.
3. Have blank and sample tubes been filled to the 10 ml mark? Are they positioned all the way down in the cuvette slot?
4. Are the reagents fresh and not expired? If questionable, retest the sample with fresh reagents.
5. Did you review all notes in the instruction leaflets about possible interferences?
6. Are there any comparable results, made with other methods, which make your own results uncertain? Are those readings necessarily valid? Have you tested a standard solution of known value?
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7. Instructions

visocolor® ECO Chlorine – free Chlorine (0.10 – 2.50 mg/l)

Procedure:
Method: Select method CHLORINE.
BLANK cuvette: Add 10 ml sample into an empty cuvette. Perform BLANK measurement.
SAMPLE cuvette: 1. Add 3 drops Cl₂-1 into an empty cuvette.
2. Add 3 drops Cl₂-2.
3. Add 10 ml sample. Close cuvette and mix.
   Clean outside of cuvette and perform sample measurement immediately.

visocolor® ECO Chlorine – total Chlorine (0.10 – 2.50 mg/l)

SAMPLE cuvette: After the determination of free chlorine open cuvette again and add 3 drops Cl₂-3. Close cuvette and mix.
       Clean outside of cuvette and perform sample measurement after 2 min.
Measurements up to 5.00 mg/l chlorine: follow procedure given above. Instead of 10 ml sample add 5 ml sample and 5 ml distilled water into the sample cuvette. Multiply the result by 2.
The content of combined chlorine can be calculated as difference of total and free chlorine.
Interferences: The determination of free chlorine measures bromine, bromoamines, iodine and, in part, chlorine dioxide as well. Higher manganese compounds simulate free chlorine. Chlorine concentrations above 10 mg/l can bleach the red reaction colour (low results). Rinse glass tubes several times thoroughly. Residues of Cl₂-3 can cause higher values for free chlorine.
Note: For the determination of bromine besides chlorine, please contact MACHEREY-NAGEL for special working instructions.

visocolor® ECO Cyanuric acid (10 – 100 mg/l)

Procedure:
Method: Select method CYANURIC ACID.
BLANK cuvette: Add 10 ml sample into an empty cuvette. Perform BLANK measurement.
SAMPLE cuvette: Add 1/2 measuring spoon Cya-1 to the same cuvette. Close cuvette and shake for about 15 s. The mixture becomes more or less turbid. Clean outside of cuvette and perform sample measurement after 2 min.
Interferences: Turbidities interfere; turbid samples have to be filtered prior to the analysis.

visocolor® ECO pH 6.0 – 8.2

Procedure:
Method: Select method pH.
BLANK cuvette: Add 10 ml sample into an empty cuvette. Perform BLANK measurement.
SAMPLE cuvette: Add 1 capsule NANOFIX pH to the same cuvette.
       Clean outside of cuvette and perform sample measurement after 3 min.
Interferences: none

The methods can be applied also for the analysis of sea water.
Disposal: The used analysis specimens can be flushed down the drain with tap water and channelled off to the local sewage treatment works.